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CASE STUDY ON DIRECT SOWING OF PADDY IN SELECTED MANDALS OF GUNTUR DISTRICT

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ABSTRACT

Rice (*Oryza sativa*) is one of the most important staple food crops in many Asian countries. The demand for rice growing, while the cost of irrigation is rapidly increasing, and adequate area to grow rice is unavailable Therefore, India is facing a major challenge to increase rice production, the main food grain. A minimum of 258 and a maximum of 395 numbers of grains per panicle were observed in the direct sown field, and a minimum of 227 and a maximum of 351 numbers of grains per panicle were observed in the traditionally sown field. The grain yield under direct sown field was observed to be 2850 kg acre^{-1} and under traditionally sown field grain yield was observed to be 2625 kg acre^{-1}. Area under direct sowing of paddy in Guntur district is increasingdue its distinct advantages. Hence, the direct seeding method requires less water and lab our, and has lower cultivation costs with comparatively equal grain yields than traditional systems and the crop matures in less duration. Timely sowing gives farmers the possibility to take up a second pulse crop in time. This method can be a good measure when the monsoons are delayed and farmers do not have time and water to raise nurseries.

KEYWORDS: Direct Sowing, Seed Drill, Tillers, Panicle Length, Yield, and Benefit Cost Ratio

INTRODUCTION

Rice (*Oryza sativa*) is one of the most important staple food crops in many Asian countries. In India it is grown in an area of 45.35 M ha with a production of 99.15 Mt and in Andhra Pradesh rice is grown in an area of 4.38 M ha with a production of 14.21 Mt. India made remarkable progress in increasing food grain production from 1950's. During this period, it increased paddy production by 4.5 times and area 42%. This is a remarkable achievement, but for the last decade or so, the production levels are stagnant. The demand for rice growing, while the cost of irrigation is rapidly increasing, and adequate area to grow rice is unavailable. Therefore, India is facing a major challenge to increase rice production, the main food grain.

Around 95% of the rice area under modern varieties is irrigated, and requires about 1200 mm to 2500 mm of water depending on soil texture, structure and profile conditions (Reddy, 1995). Of all the major cereal crops grown in India, rice constitutes to 24% consuming higher portion of available water.

The lab our requirement is also higher in the rice production. About 10 to 15 lab our per acre are required for rice transplanting, weeding (20 per acre) and harvesting (10 per acre) (Technical program, 2011). The availability of lab our is

becoming scarce; as rural people are migrating to nearby cities and towns for various reasons or being hired in the government rural employment guarantee program and non-agricultural activities with higher wage rates (personal communication with farmers). Hence, the cost of lab our in rice production increased during recent years Annually, 4.5 million tones of methane are emitted from paddy in India (PepsiCo International, 2011). Rice cultivation is the second largest contributor of global agricultural methane after enteric fermentation.

The direct seeding of ricerefers to the spreading of seeds in fields before or immediately after pre-monsoon showers the method does not require raising of nursery and transplanting of seedlings. The seeds are directly sown in the main field by spreading manually or with the help of a tractor and attached implements at a depth of 3-5 cm. Based on the availability of water fields need to be irrigated 45-60 days after sowing and turned into a wet system. Hence, the direct seeding method requires less water and lab our, and has lower cultivation costs with comparatively equal grain yields than traditional systems and the crop matures in less duration. Nonetheless, weed growth is high in the direct seeded rice and famers are using pre- and post-emergence herbicides to overcome the problem. Moreover, the crop comes to an early harvest. Timely sowing gives farmers the possibility to take up a second pulse crop in time. This method can be a good measure when the monsoons are delayed and farmers do not have time and water to raise nurseries. The study was taken up keeping in view the importance of direct sowing of paddy.

MATERIALS AND METHODS

The study was taken up during the year 2013. The data collection was done by visiting various paddy fields in different villages of Guntur district. The experiment consists of two treatments, viz direct sown and conventionally sown paddy. Different parameters were taken before and after the harvesting of the crop. The varieties found under direct sowing are BPT 2270, BPT 5204 and NLR 523.

Types of Fields

Two types of fields namely, direct sown and conventionally transplanted with respect to various parameters like number of hills per square meter, number of tillers per hill, number of grain per panicle, total weight of grain per acre, cost analysis etc. Direct sowing of paddy is of two kinds. i.e., Dry rice cultivation and Wet rice cultivation. In Dry rice cultivation, the seed was directly sown with the help of multi crop seed drill or it may be broadcasted after the land preparation without water in the field. Within 5 days after sowing watering should be given. In wet rice cultivation, all the field operations are carried out in puddled fieldsituation. The drum seeder or broadcasting method may be used for the seeding operation. In conventional method, the nursery is raised separately and the main field is puddled. After that the seedlings are manually transplanted in the field.

The different observations that are found during the survey are crop parameters, machine parameters and economical data of crop.

Crop Parameters

The crop parameters include the details of number of hills, number of tillers, Panicle length, Number of grains per panicle and Grain yield.

- **Number of Hills**

Numbers of hills were counted from both the treatments in each replication at the time of maturity and expressed

as total number of hills per square meter.

- **Number of Tillers**

Number of tillers were counted from both the treatments in each replication at the time of maturity and expressed as total number of tillers per square meter.

- **Panicle Length**

Randomly selected 5 panicles from both the treatments in each replication at the time of maturity Length of all panicles from each hill were measured from the base of primary rachis to the tip of the top most spikelet and expressed in cm.

- **Number of Grains per Panicle**

Grains were collected from 5 randomly selected panicles from earlier collected samples for panicle length determination. The total number of grains were counted and averaged to arrive at total number of grains per panicle.

- **Grain Yield**

Grain yield was determined from one square meter area. Three observations were taken from direct sown and traditionally sown fields. Thoroughly sun dried harvested produce was weighed for total biological weight. After this, harvested produce was beaten against concrete floor manually to get separate the grains from panicle; grain yield was noted and expressed in kg $acre^{-1}$.

MACHINE PARAMETERS

The machine parameters includes the details of type of land preparation equipment used, seed drill used, seed rate per acre and spacing (i.e. spacing between row to row and spacing between plant to plant in a same row).

Economic Data

The economic data includes the calculation of total cost of cultivation/acre (Rs.), gross returns @ Rs.1250 / bag of 75 kg, net returns per acre (Rs.) and benefit cost ratio.

The costs of different operations from land preparation to harvesting with seed, weedicide and fertilizer cost were noted for both for the direct sown and traditional method of paddy cultivation. The total amount of returns got after harvesting also noted. The profit was calculated from investment and returns from the following formula.

Profit = Returns – Investments

The benefit-cost ratio for the direct sown and traditional method of paddy cultivation was calculated from the following formula.

$$\text{Benefit Cost ratio} = \frac{\text{Total Returns}}{\text{Total Investment}}$$

RESULTS AND DISCUSSIONS

The seed drills that farmers using for direct sowing of paddy was found to beflutted roller and trough type. The plant to plant spacing is found to be not constant and it varied from 10 to 15 cm. the seed rate was low with the seed

drills compared to the traditional sowing of paddy.

Number of hills recorded per square meter at the time of maturity in both the treatments and it is found that in the direct sown field had minimum number of hills per sq m (15 per sq m) as compared to traditionally sown field (17 per sq m). This is due to the spacing of seed in direct sown seed, but in traditional method spacing is not maintained. The results of hills per sq m are presented in Table 1

Number of tillers recorded per square meter at the time of maturity in both the treatments and it is found that in the direct sown field had maximum number of tillers per sq m (398 per sq m) as compared to traditionally sown field (302 per sq m). This is because the competition for nutrients is less in direct sown field and the other factors like proper aeration, management practices. The results of tillers per hill are presented in Table 2. Length of panicles was measured at the time of maturity in both the treatments and average length of panicle under direct sown field had recorded to be 80 cm, which was found to be slightly more than a panicle length in traditionally sown field 70cm. A minimum of 258 and a maximum of 395 numbers of grains per panicle were observed in the direct sown field, and a minimum of 227 and a maximum of 351 numbers of grains per panicle were observed in the traditionally sown field. The grain yield under direct sown direct sown field was observed to be 2850 kg acre^{-1} and under traditionally sown field grain yield was observed to be 2625 kg acre^{-1}.

Table 1: Number of Hills per Square Meter at the Time of Maturity

Number of Hills per Square Meter		
Variety	**Direct**	**Traditional**
BPT 5204	25	29
BPT 2270	25	29
NLR 523	26	30

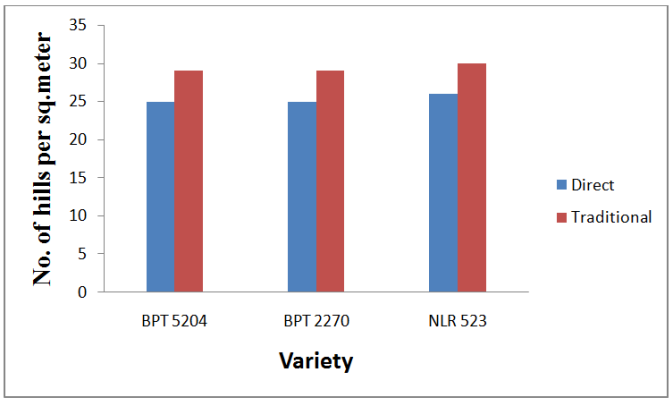

Figure 1: Average Number of Hills per Square Meter in Fields Sown by Direct Sowing and Traditional Method with Different Varieties of Paddy

Table 2: Number of Tillers per Hill at the Time of Maturity

Number of Tillers per Hill		
Variety	**Direct**	**Traditional**
BPT 5204	21	19
BPT 2270	20	17
NLR 523	21	17

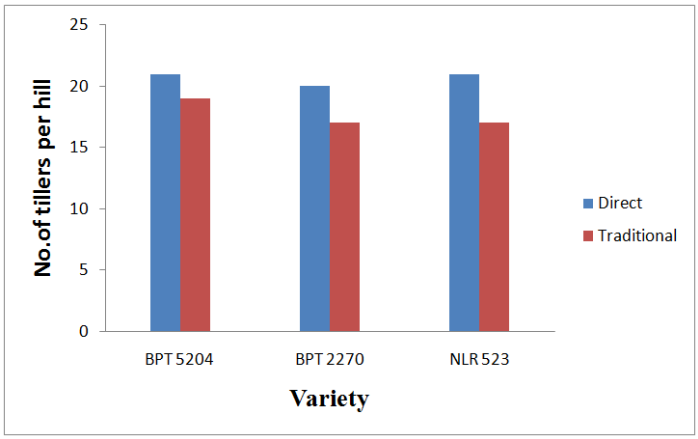

Figure 2: Average number of Tillers per Hill in Fields Sown by Direct Sowing and Traditional Method of Different Varieties of Paddy

Direct sowing requires less investment than traditional method, this is due to avoiding puddling of field, raising of nursery and transplanting of seedlings and direct sowing gives more yield than the traditional method. The cost of direct sowing is less than that of the traditional method. And the benefit cost ratio of the direct sowing (2.52) is more than that of the traditional method (2.06).

CONCLUSIONS

The number of tillers per sq. m, Average length of panicle, and number of grains per panicle, Weed problems, straw yield and grain yield is found to be higher in direct sown field. The number of hills per sq. m, cost of cultivation and lab our requirement is more in traditionally sown field than in direct sown field. Direct sowing of paddy is useful in getting max yield, returns and saving of water.

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